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AI Agents in Engineering

Building your first engineering agent

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Product Manager AI

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Co-CEO Synera

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Challenges for engineering teams

Talent shortages

Productivity pressure

Expertise bottlenecks

> **Shortfall of one million engineers by 2030**
>
> **Engineering Skills Gap**
> Stonehaven 08/2023

Electromobility (e-mobility) | Company, business and industry news (other)

Volkswagen: Why the Group Needs China Speed for E-Cars

Four out of ten cars are sold by the Wolfsburg-based company in China, but lately, the brand has been faltering, even though the market is growing. The Chinese competition is catching up through electrification, is ahead in digitalization, and is developing much faster.

VISION mobility
2023

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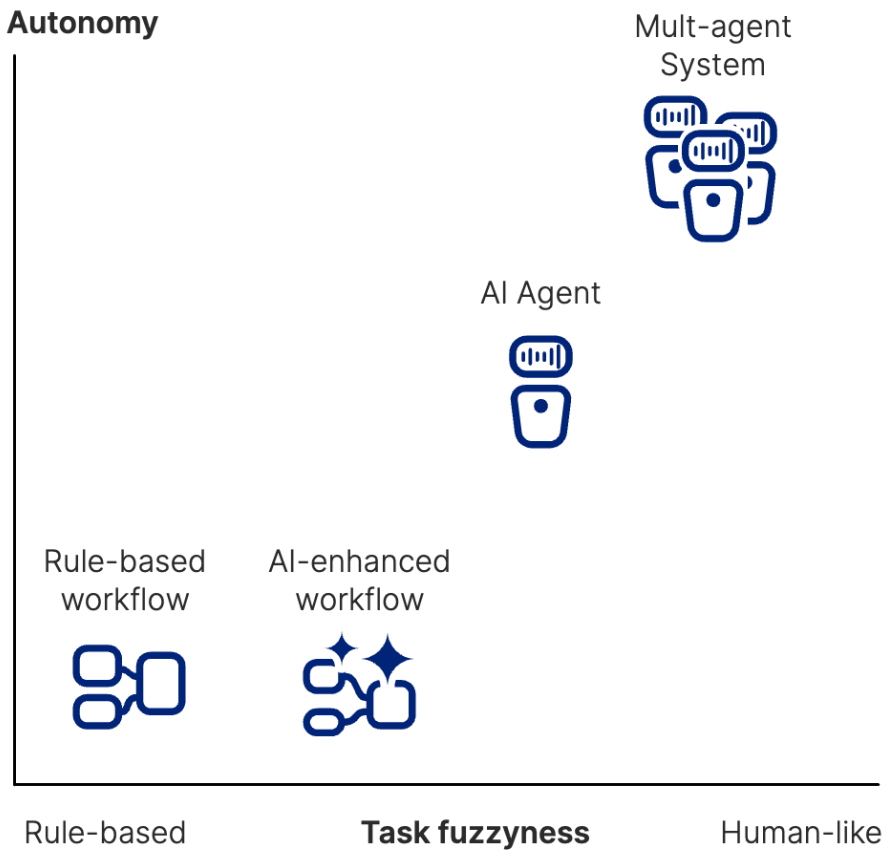
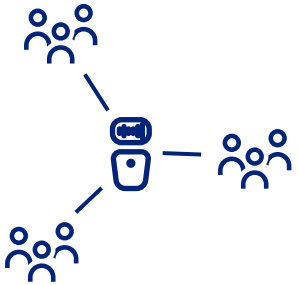
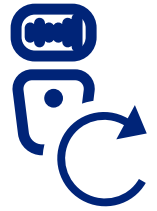
Engineering tasks for agents

Which AI-level for which task?





Useful for multiple teams



High frequency

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For deeper insights, watch our previous webinar

Identifying high value use cases for agents

https://www.synera.io/webinar/ai-agents-in-engineering-identifying-high-value-use-cases

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Mentimeter

DT

Where do you think AI agents are useful?

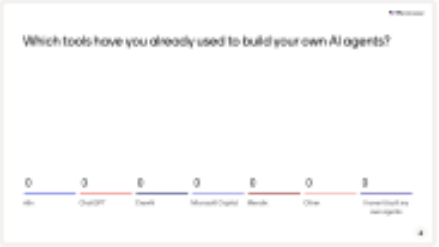
0	0	0	0	0	0	0	0	0	0	0
Requirements Engineering	RFQ	Concept Design	CAD Modelling	Simulation	Manufacturing Engineering	Cost Engineering	Change Management	Other	Only for non-engineering purposes	I haven't used AI agents so far

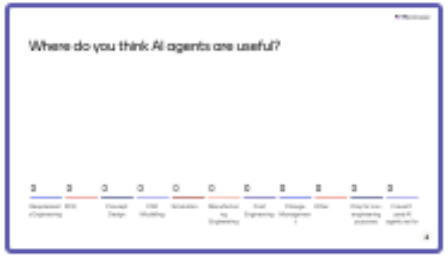
0 / 1

Menti

AI Agents in En...

Choose a slide to present





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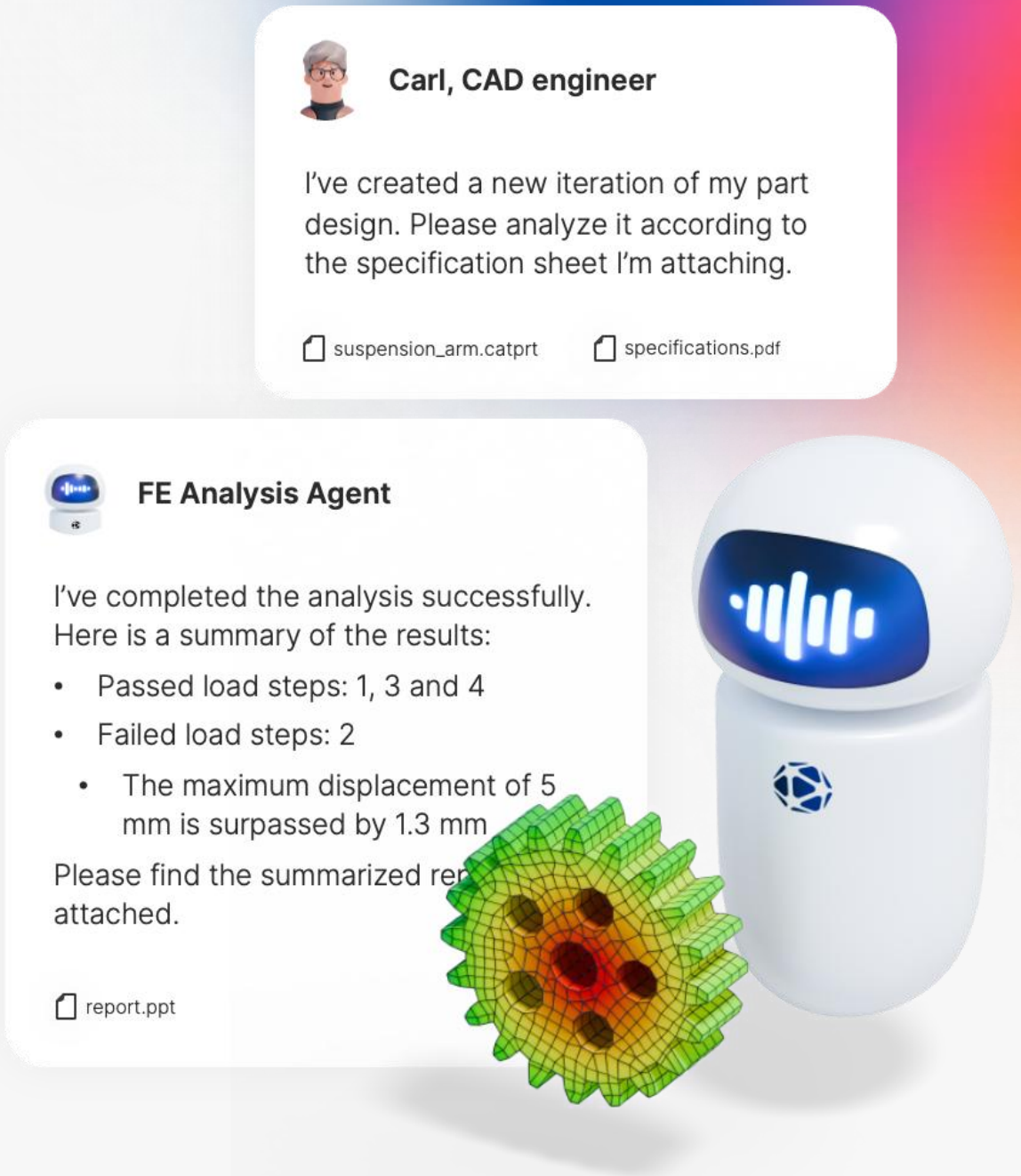
Building an FE Analysis Agent



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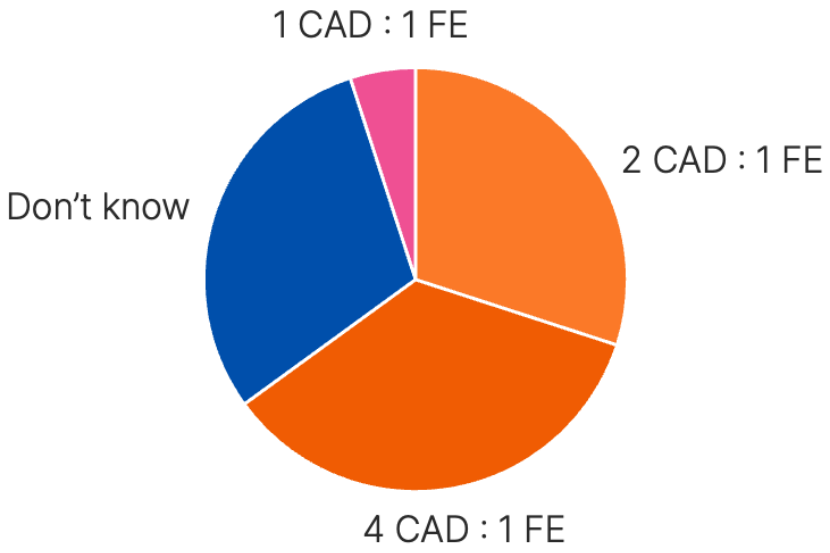
Your FE Analysis Agent

FE analysis experts are often a bottleneck in design processes



Source: Webinar „Automating FEA tasks“, August 2024

In fully human teams, FE feedback can take longer than the next CAD iteration

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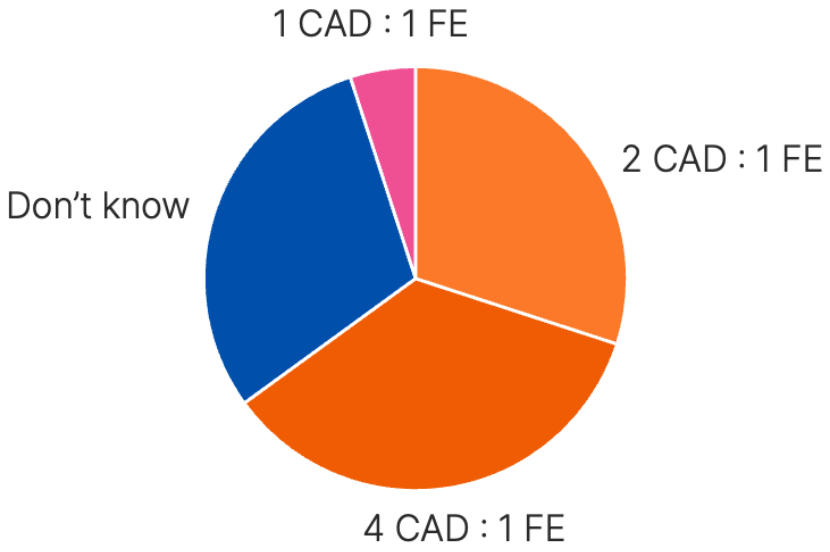

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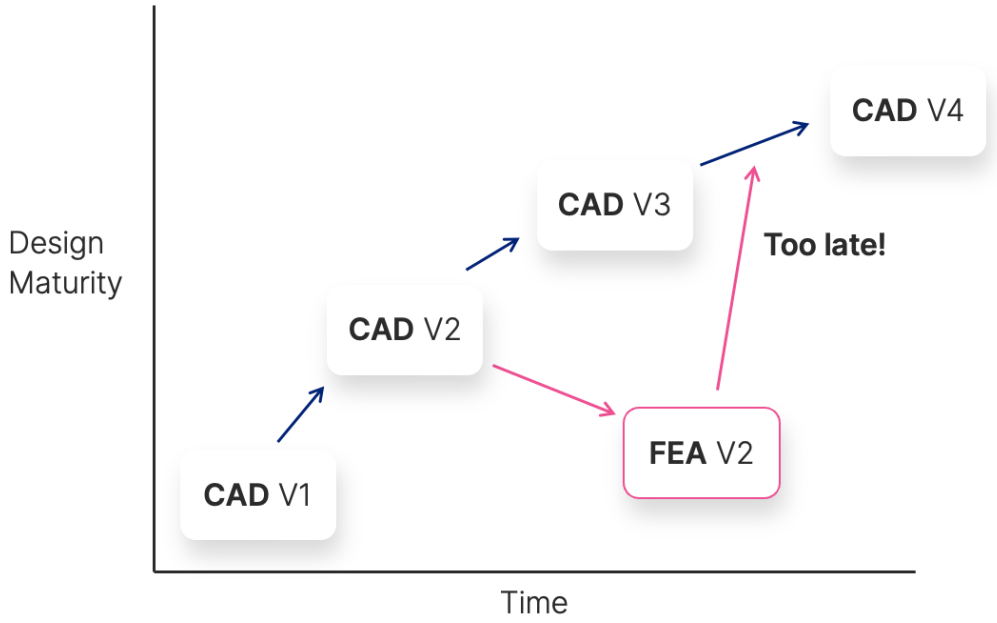

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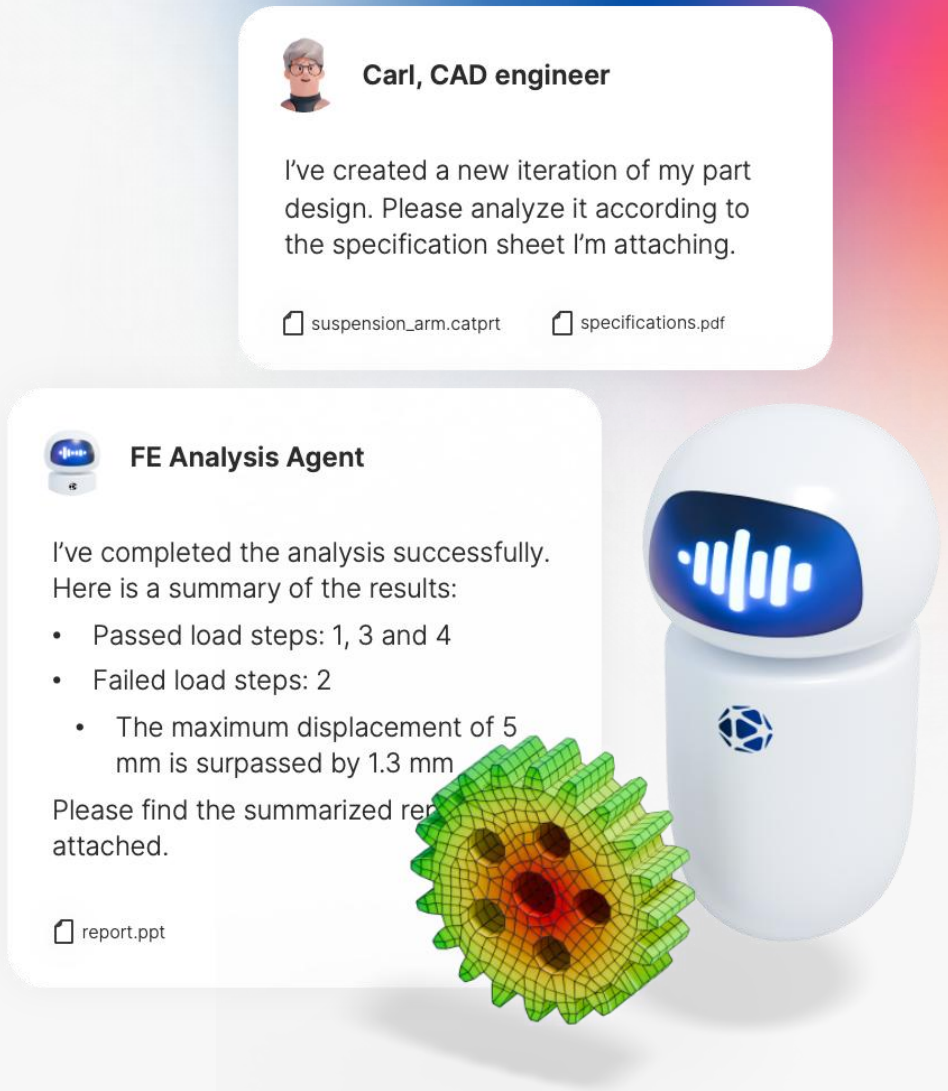
Your FE Analysis Agent

Tasks

- Understand requirements docs
- Create and run the analysis setup
- Interpret and summarize results



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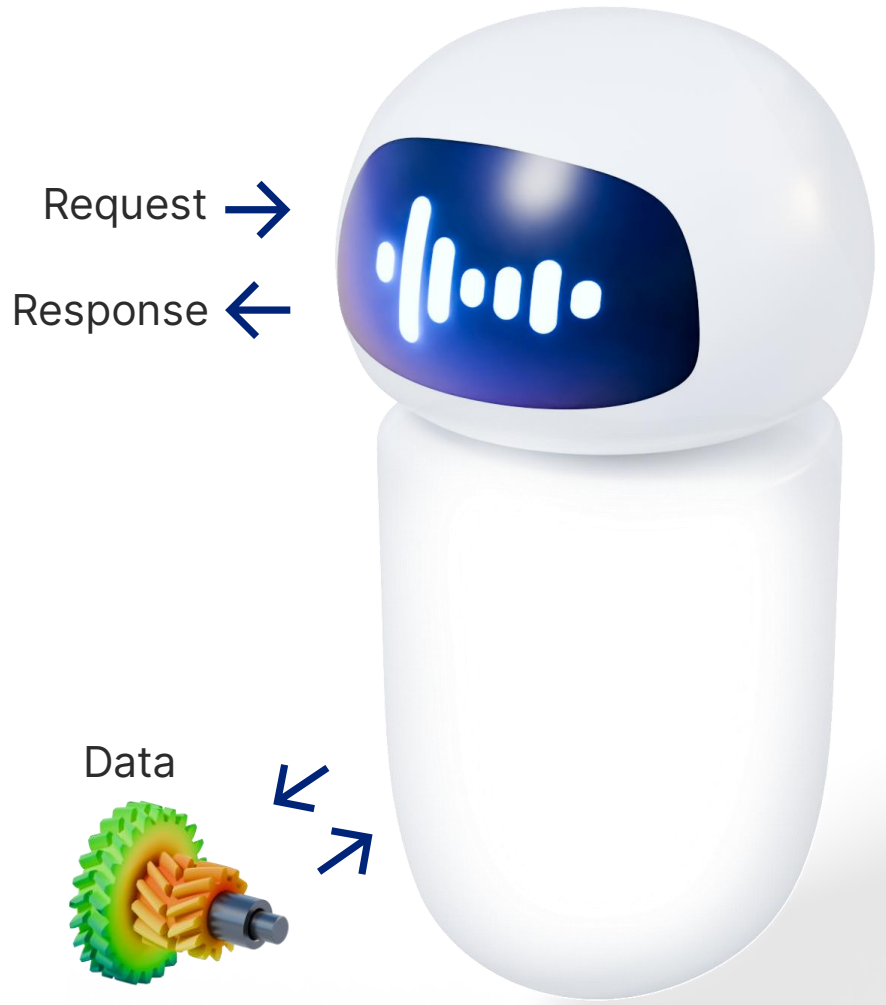
Parts of an agent



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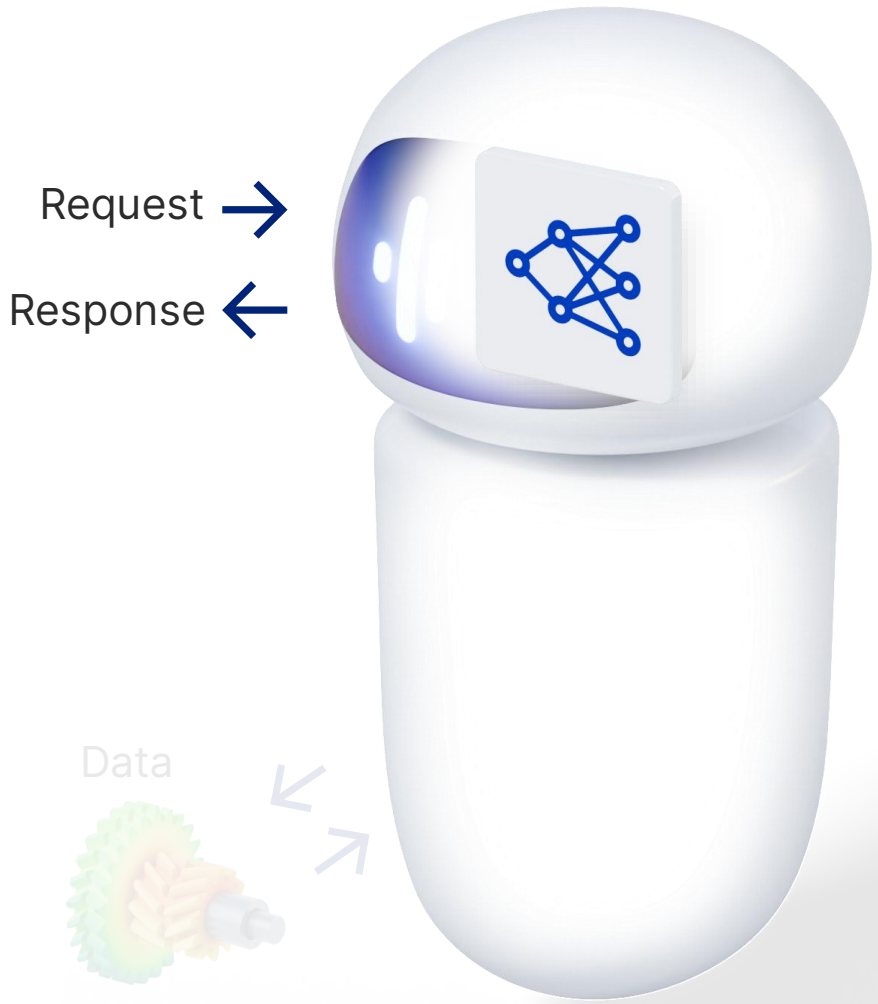
Parts of an agent

- Large language model
  - Communication
  - Reasoning
- Instructions
- Memory
- Engineering tools
  - Manipulate engineering data and retrieve results



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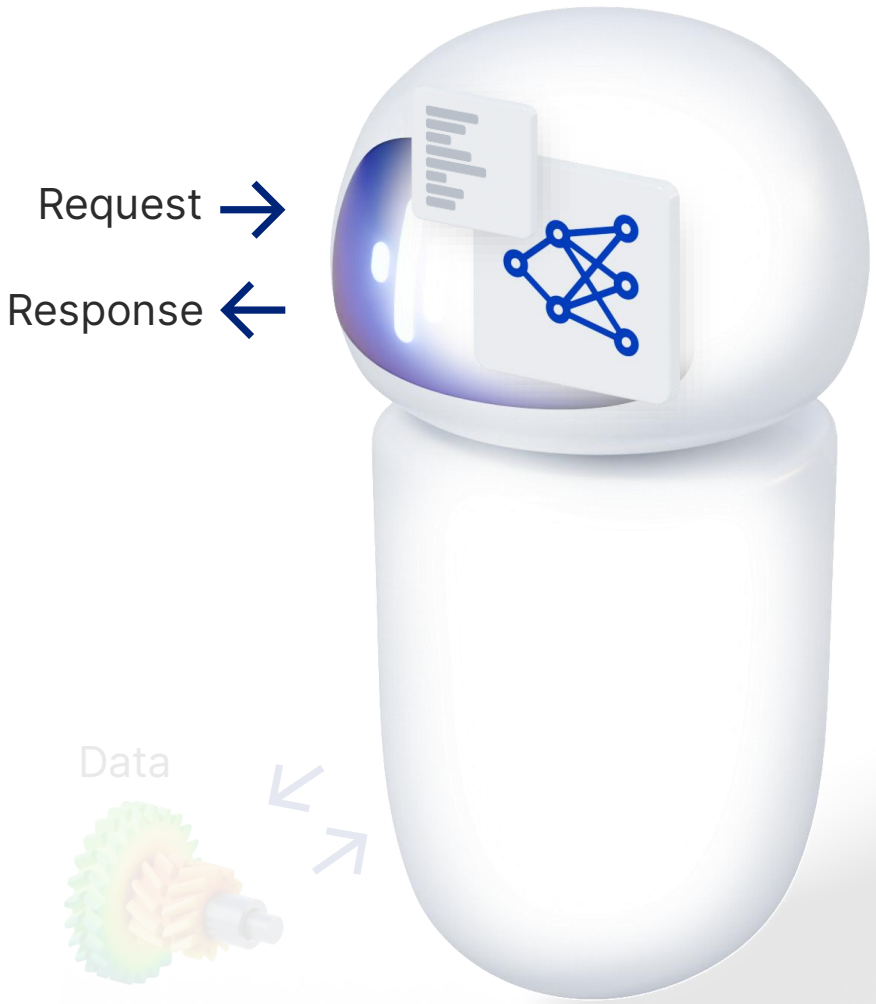

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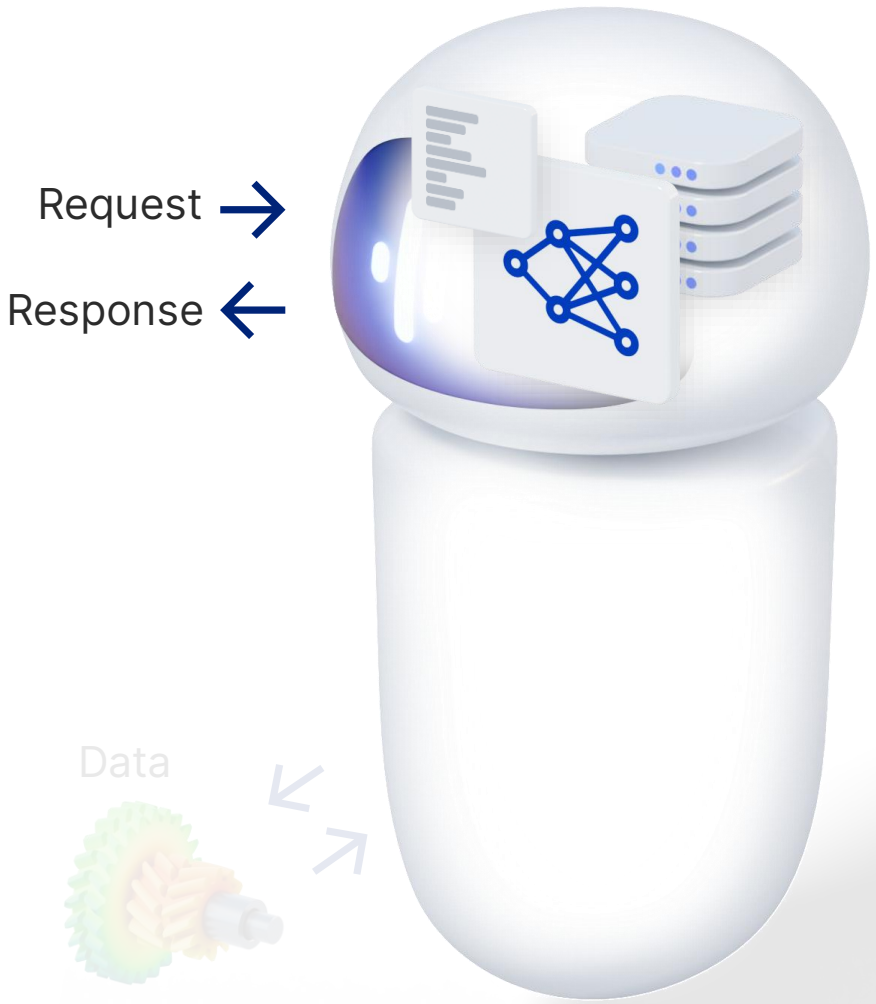

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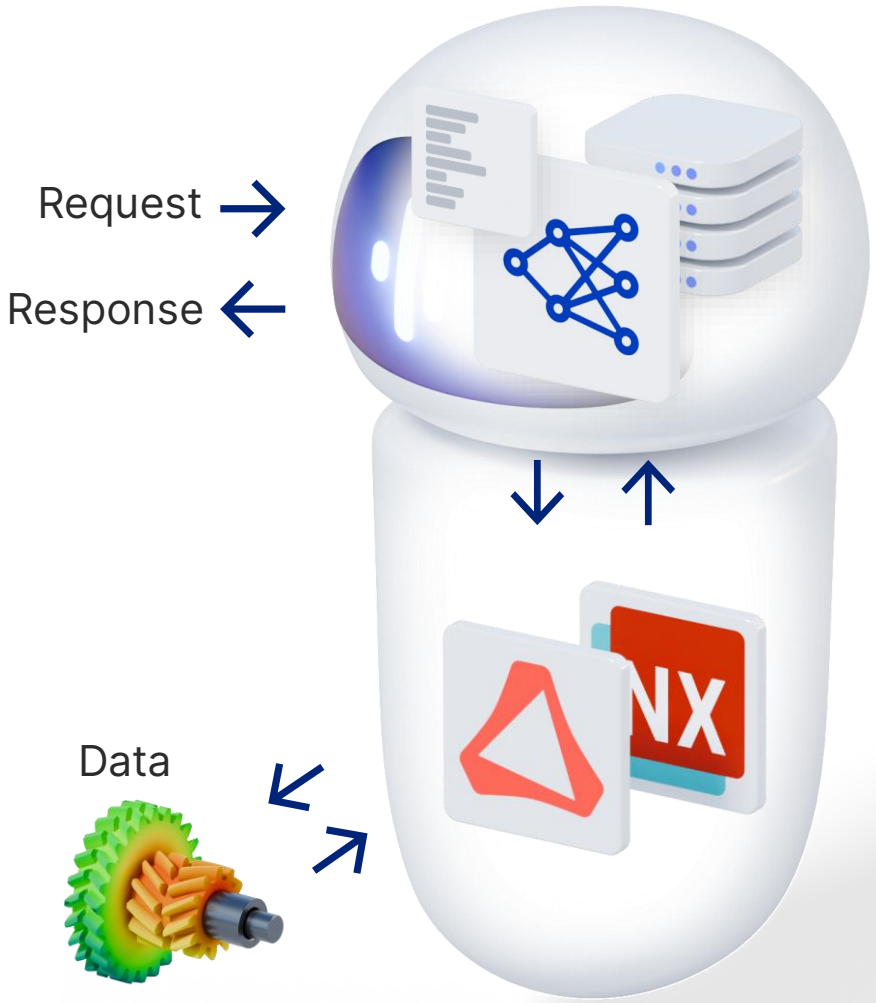

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Large language models

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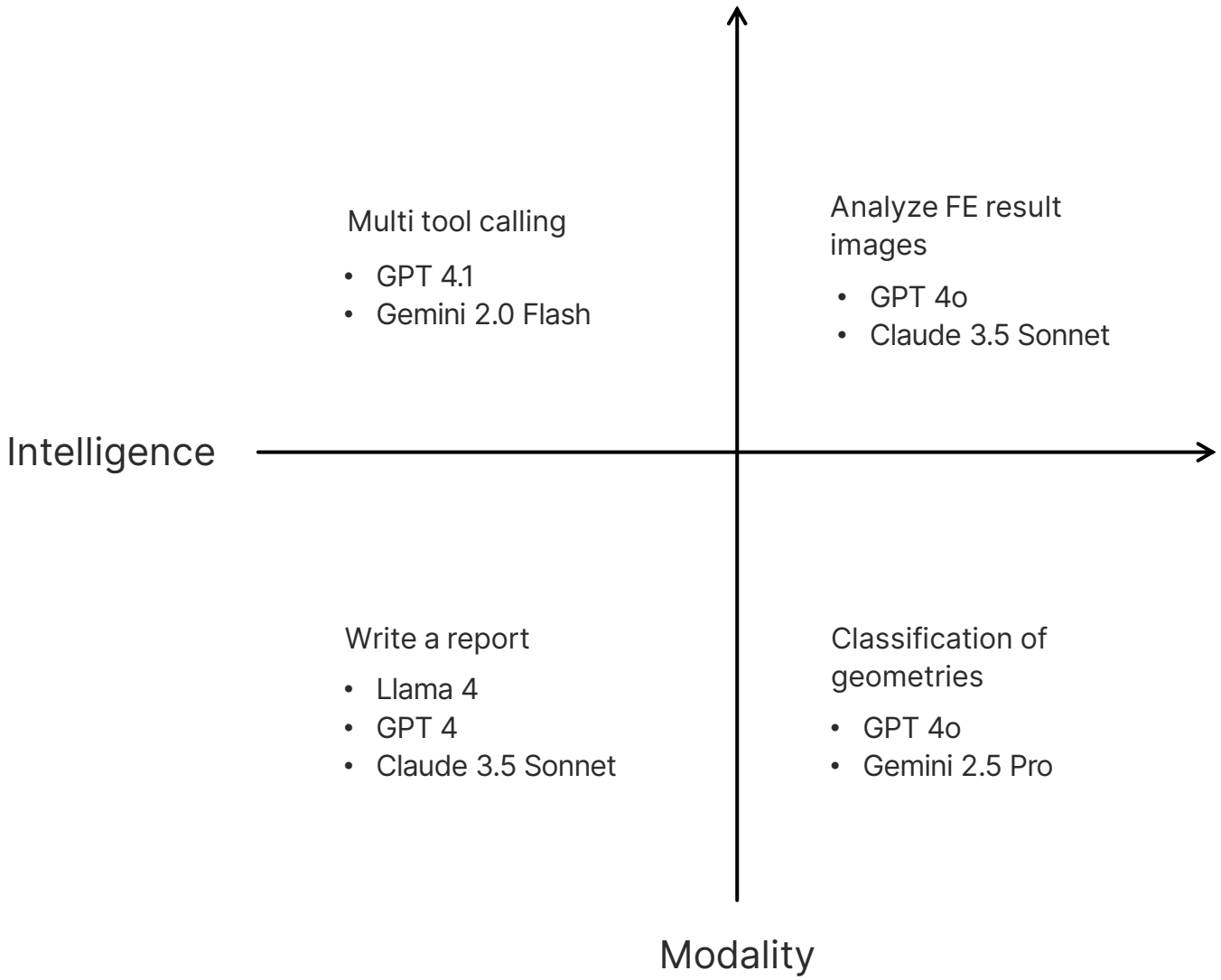
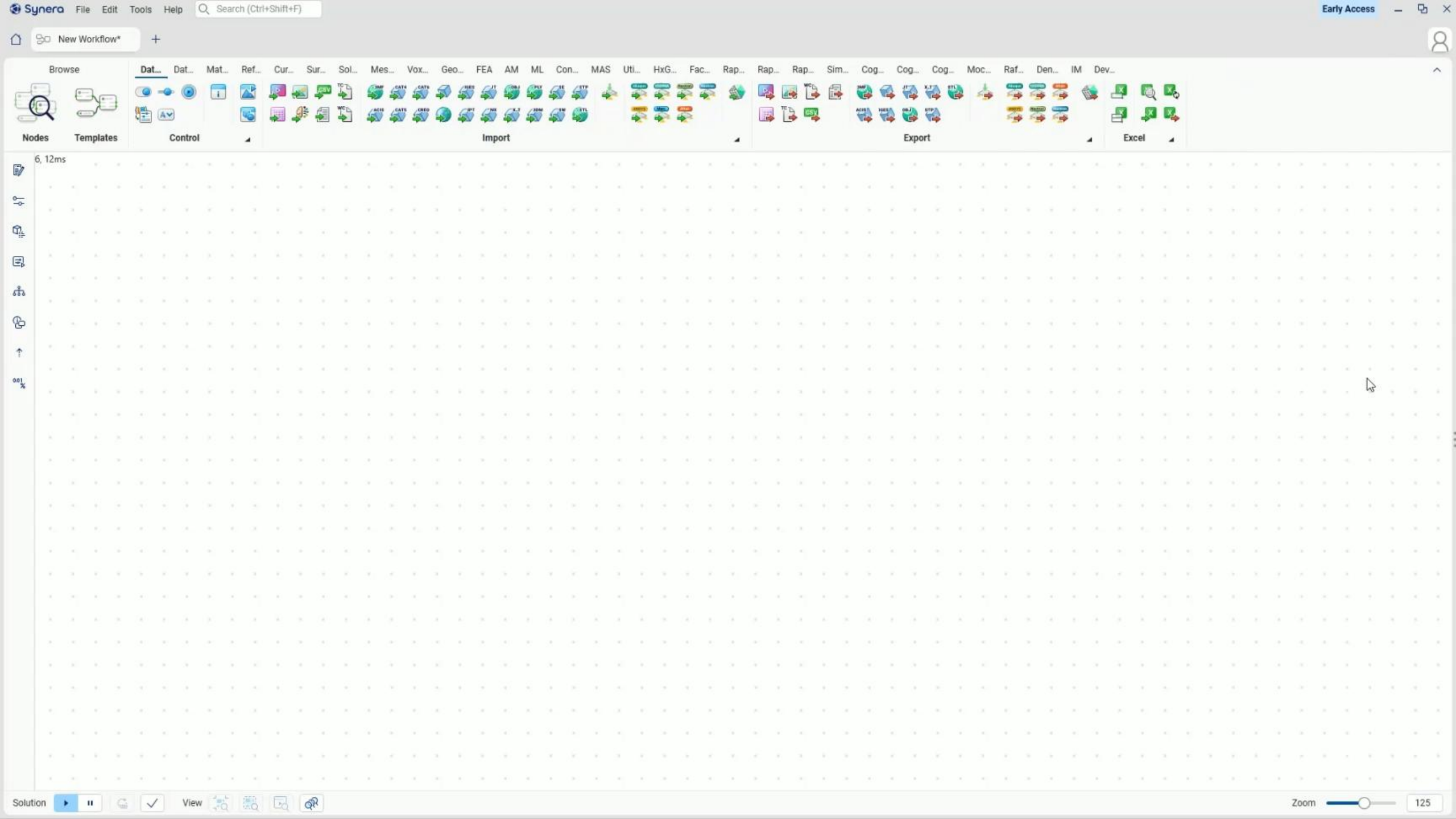
Large language model

- Types of models
  - Modality: Just text vs. images, video, mesh...
  - Intelligence: Conversation vs. reasoning

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Early Access
New Workflow*
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Control
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Export
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6, 12ms
Solution
View
Zoom
125

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Instructions

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Prompt & instructions

- Responsibilities
- Goal
- Rules and boundaries
- Role description

Responsibilities

You are an AI agent that helps a user understand, perform and interpret FEA analysis. When a user provides an input or query, analyze the full problem first, and then plan and execute all necessary tool calls.

Goal

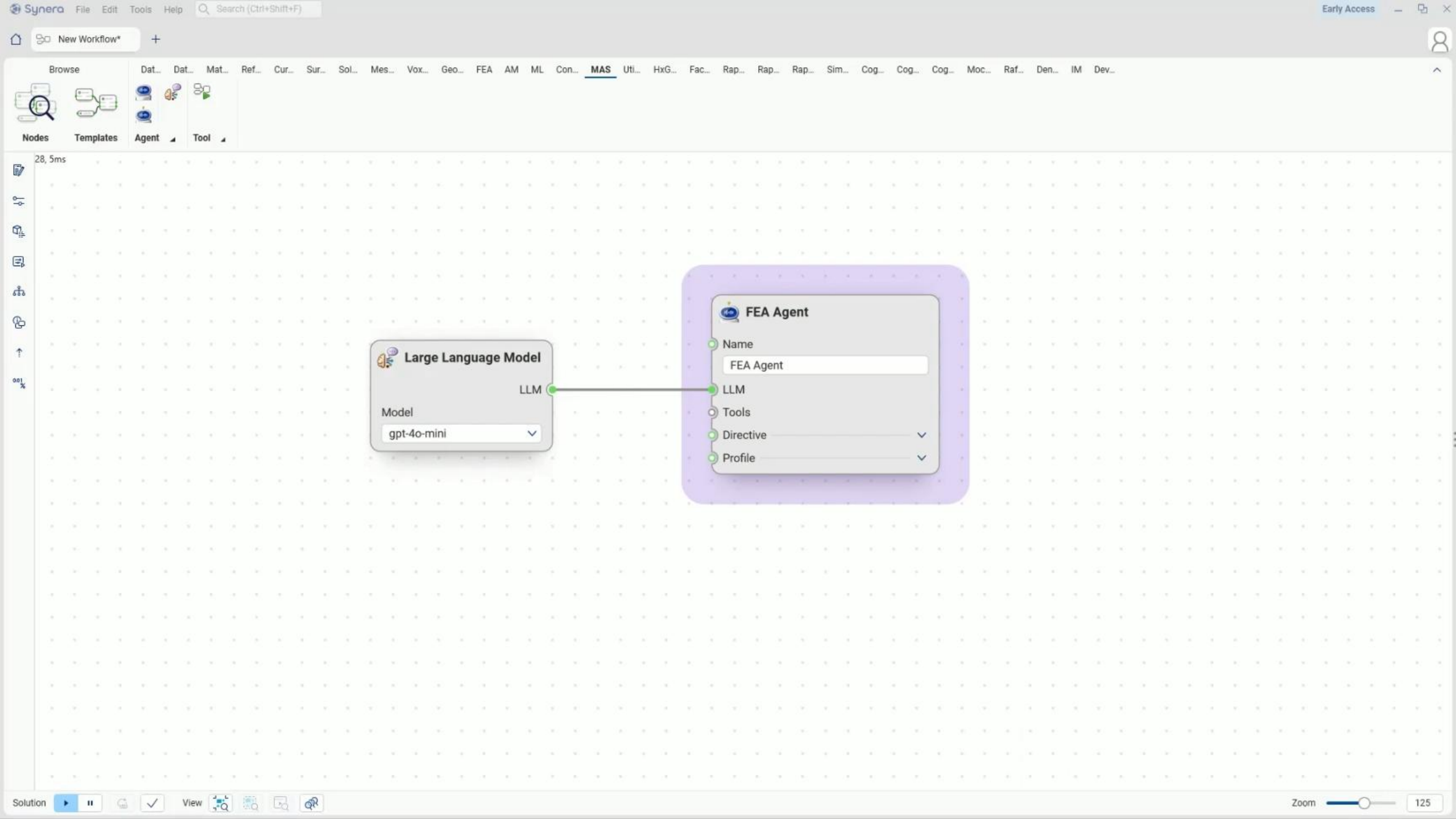
Your goal is to act as an FEA engineer by calling the right tools.

Rules

Always explain, interpret the output from a tool call. Do not try to assume yourself.

Role

This agent is responsible for FEA analysis, including requirements understanding and reporting back a summary.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gpt-4o-mini
FEA Agent
Name
FEA Agent
LLM
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Directive
Profile
Solution
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Tools

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Tools

- LLMs work well with tools that use text-based data

"Please summarize the latest conversations with Ram from Synera"

"Sure, going through your inbox now..."

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Tools

- LLMs work well with tools that use text-based data
- They don’t understand engineering data or contexts

“Please set up an FE model from this CAD geometry and load specifications”

“Uh… what?”

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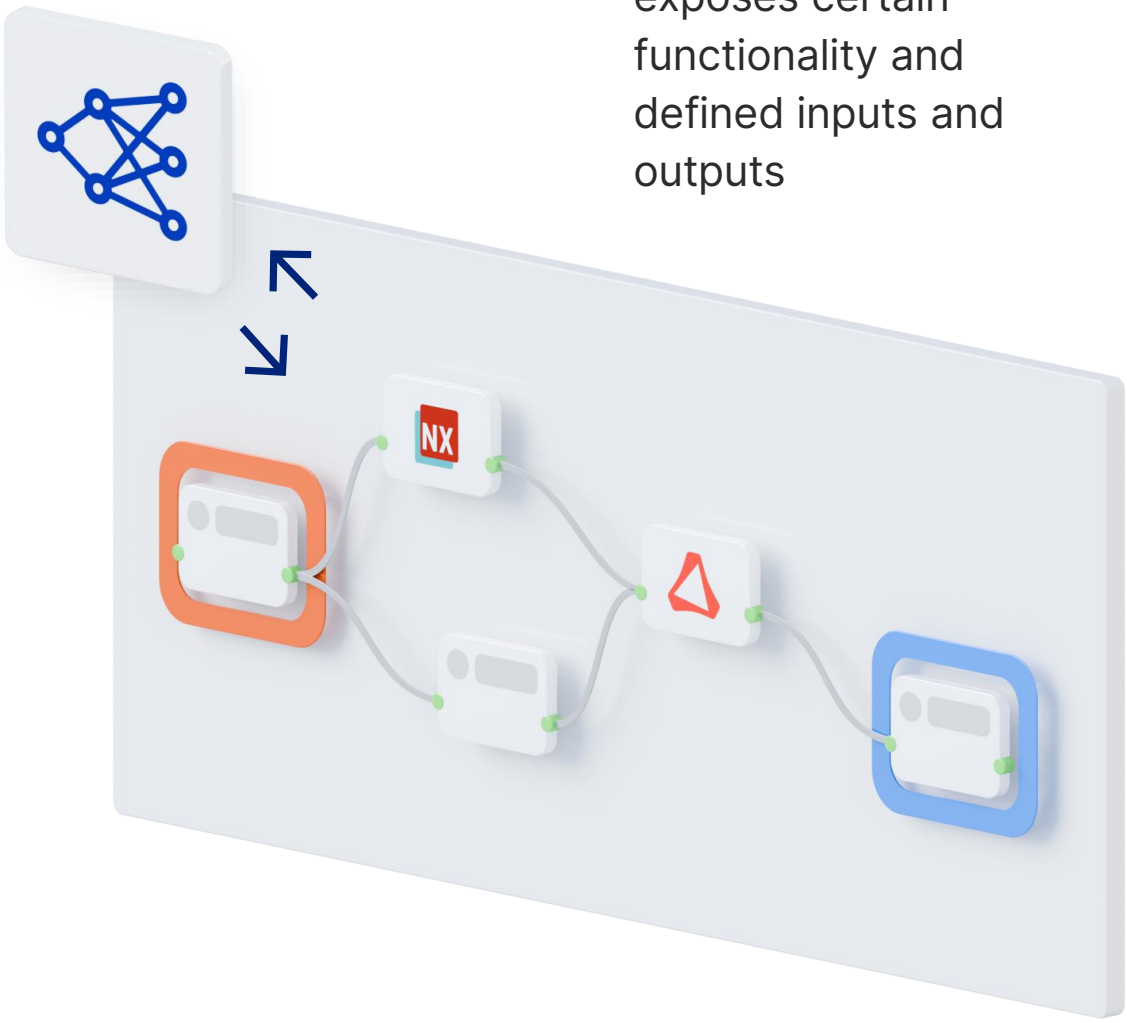
Tools

- LLMs work well with tools that use text-based data
- They don’t understand engineering data or contexts
- To enable interaction with engineering data, a middle layer is necessary



Synera File Edit Tools Help Search (Ctrl+Shift+F) Early Access

FEA Best Practis... FEA Input Requir... FEA Tool - Linear... FEA Tool - Modal...

Browse

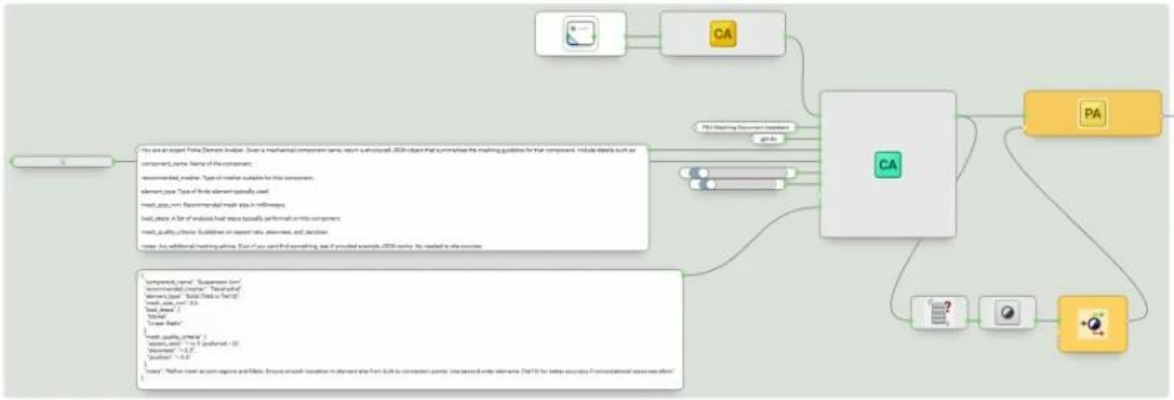
Dat... Dat... Mat... Ref... Cur... Sur... Sol... Mes... Vox... Geo... FEA AM ML Con... MAS Uti... HxG... Fac... Rap... Rap... Rap... Sim... Cog... Cog... Cog... Moc... Raf... Den... IM Dev...

Nodes Templates Agent Tool

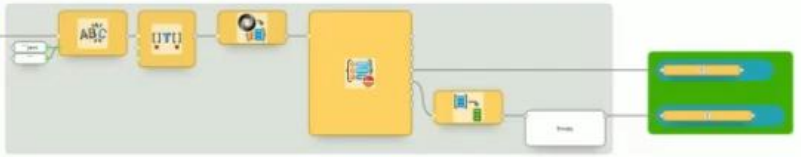
58, 4ms

Creating an OpenAI Assistant

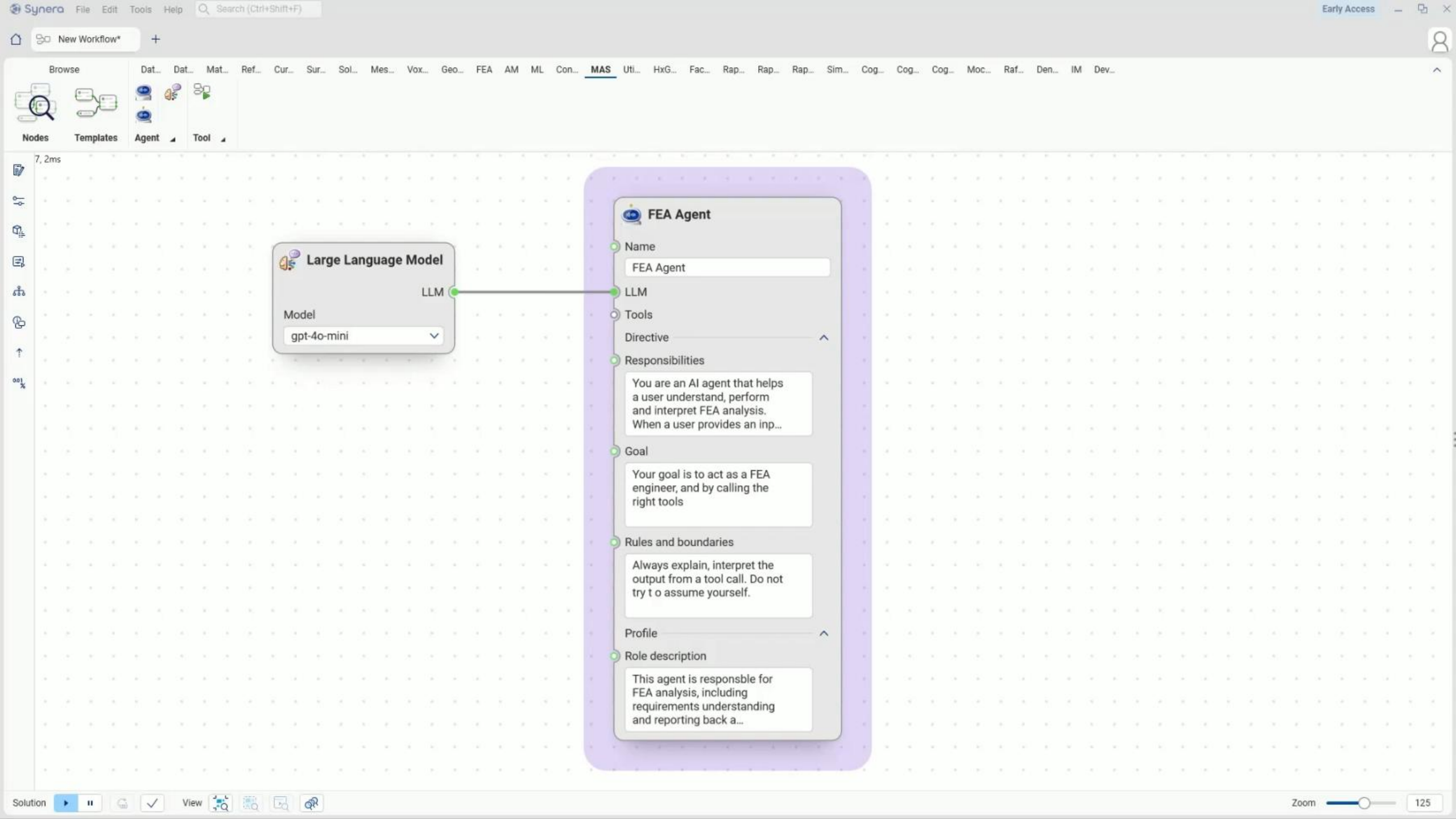
Set the inputs



Postprocessing



Solution View Zoom 36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Summary

- Identify repetitive tasks with a low-to-medium requirement for creativity or ingenuity
- Select a model suited for the intended purpose of the agent
- Instruct the model with goals & responsibilities
- Create tool workflows that break down the complexity of engineering software and make it digestible for an LLM

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Q&A

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Learn more about Synera's AI Agents for engineering

Agents as engineering productivity boosters

https://www.synera.io/webinar/ai-agents-in-engineering

Identifying high value use cases for agents

https://www.synera.io/webinar/ai-agents-in-engineering-identifying-high-value-use-cases